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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,619	03/29/2004	Hung-Wen Su	0941-0938PUS1	9827

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EXAMINER

MACARTHUR, SYLVIA

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 06/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

VB
ML

Office Action Summary	Application No.	Applicant(s)	
	10/810,619	SU ET AL.	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2004 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

22

TS

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Hansen et al (US 6,135,724).

Hansen et al teaches a multistage wet processing chamber. The apparatus further comprises a bath tank 14, a rotatable wafer chuck, and a sliding element disposed on one end of the rotatable wafer chuck, see Fig.8.

Regarding the wafer being covered with a metal layer. This is a matter of an intended use and is not given patentable weight as the apparatus of Hansen et al is inherently capable of utilizing this type of substrate.

3. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by Walsh (US 3,964,957).

Walsh teaches a multistage wet processing chamber. The apparatus further comprises a bath tank (etching tank 11), a rotatable wafer chuck (see col. 6 lines 1 and 2), and a sliding element disposed on one end of the rotatable wafer chuck (see col.5 lines 49-52).

Art Unit: 1763

Regarding the wafer being covered with a metal layer. This is a matter of an intended use and is not given patentable weight as the apparatus of Walsh is inherently capable of utilizing this type of substrate.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2,4, 6, 8, 10, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walsh or Hansen et al in view of Berdan et al (US 3,898,095).

Regarding claims 2 and 4: Walsh and Hansen et al fail to teach a front suppression line.

Berdan et al teaches a method of etching aluminum.

Berdan et al teaches a manifold pipe 22 (front suppression line and rinse lines).

Berdan et al teaches in col.3 lines 43-48 that the front suppression line is used to rinse the etchant from the front of the substrate.

Regarding claim 6: Berdan et al illustrates Fig.1 Manifold pipes 22 are placed along the wafer.

Regarding claims 8, 10, and 12: Rear suppression line 22 illustrated in Fig.1. The apparatus comprised a rear rinse line disposed behind the wafer

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a rinse and suppression in the apparatus of Walsh or Hansen et al to

Art Unit: 1763

keep the etching from splashing on the wafer and to ensure that the wafer rinsed prior to the next processing step as taught by Berdan et al.

6. Claims 3 and 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Walsh or Hansen et al in view of Berdan et al (US 3,898,095) as applied to claims 2, 4,6, 8, 10, 12 above, and further in view of Chu et al (US 6,051, 505).

The teachings of Walsh or Hansen et al modified by Berdan et al were discussed above.

Walsh or Hansen et al modified by Berdan et al fails to teach a flow rate of between 5-100 sccm.

Chu et al teaches an inert gas flow rate of 50-1000 sccm. The motivation to introduce this gas at the above range is that it is the optimal flow rate for a purge gas according to Chu et al.

Thus it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to introduce a gas the range of Chu et al in order to provide an optimal flow rate for purging and thus provide a more consistent and uniform manufacturing process.

7. Claims 5, 7, 11, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walsh or Hansen et al in view of Berdan et al (US 3,898,095) as applied to claims 2, 4,6, 8, 10, 12 above, and further in view of Becker et al (US 6,641,708).

The teachings of Walsh or Hansen et al modified by Berdan et al were discussed above.

Art Unit: 1763

Walsh or Hansen et al modified by Berdan et al fails to teach a flow rate of between 500 and 30000 ml/min.

Becker et al teaches a method and apparatus wherein fluid flow is performed at about 500 ml/min.

The motivation to introduce this gas at the above range is that it is the optimal flow rate for a purge gas according to Becker et al.

Thus it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to introduce a gas the range of Becker et al in order to provide an optimal flow rate for purging and thus provide a more consistent and uniform manufacturing process.

8. Claims 14, 15, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walsh or Hansen et al in view of Brown et al (US 2003/0209255).

The teachings of Walsh and Hansen et al were discussed above.

Both fail to teach that the wafer has a metal layer.

Brown et al teaches backside etching in a scrubber. Wafer W has a copper layer (Regarding claim 24) formed on the front side of the wafer according to page 1 [0011].

The motivation to provide the wafer with a metal layer is that it is the desired layer for the optimal process result.

Thus it would have been obvious at the time of the claimed invention to provide a wafer with a metal layer as taught by Brown et al.

Art Unit: 1763

9. Claims 16-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walsh or Hansen et al in view of Brown et al as applied to claims 14, 15, 24, and 26 above, and further in view of Berdan et al.

The teachings of Walsh or Hansen et al modified by Brown et al were discussed above. All fails to teach a front suppression or rinse flow.

Berdan et al teaches a method of etching aluminum.

Berdan et al teaches a manifold pipe 22 (front suppression line and rinse lines).

Berdan et al teaches in col.3 lines 43-48 that the front suppression line is used to rinse the etchant from the front of the substrate.

Berdan et al illustrates Fig.1 Manifold pipes 22 are placed along the wafer. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a rinse and suppression in the apparatus of Walsh or Hansen et al modified by Brown et al to keep the etching from splashing on the wafer and to ensure that the wafer rinsed prior to the next processing step as taught by Berdan et al.

10. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Walsh or Hansen et al in view of Brown et al as applied to claims 14, 15, 24, and 26 above, and further in view of Dunn (US 6,539,963).

The teachings of Walsh or Hansen et al in view of Brown et al were discussed above.

Walsh or Hansen et al modified by Brown et al fails to teach a bath comprising a solution of sulfuric acid, hydrogen peroxide, and DI water.

Art Unit: 1763

Dunn teaches a wet processing system 10 filled with "Piranha" which is a mixture of sulfuric acid, hydrogen peroxide, and DI water see col.4 lines 32-38. Dunn notes that the type of etchant mixture used is based upon the type wafer used and the desired processing result. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide a Piranha solution as the etchant mixture.

10. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Walsh or Hansen et al in view of Brown et al as applied to claims 14, 15, 24, and 26 above, and further in view of Erk et al (US 5,593,505).

The teachings of Walsh or Hansen et al in view of Brown et al were discussed above.

Walsh or Hansen et al modified by Brown et al fails to teach a wafer rotated at a speed of 5 to 300 rpm.

Erk et al teaches a method and apparatus of wet etching wherein a wafer is rotated. According to col.6 lines 15-20 the wafer is rotated at 8 rpm and preferably 12 and 18 rpm. The rotation speed is an optimizable parameter. The motivation to combine the teachings of Erk et al in the method of Walsh or Hansen et al as modified by Brown et al is that the rotational speed of Erk et al will result in a more uniformly processed wafer.


Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the core hours of 9 a.m. and 3 p.m..

Art Unit: 1763

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sylvia R MacArthur
Patent Examiner
Art Unit 1763

June 6, 2005